

## CLAIMS

We claim:

- [c1]            1.        A method for retracting a landing gear of an aircraft during takeoff, the method comprising:
- while the aircraft is moving down a runway, initiating movement of a landing gear door to an open position from a closed position in which the landing gear door at least partially covers a landing gear well;
- after initiating movement of the landing gear door, receiving a request to retract the landing gear; and
- in response to receiving the request to retract the landing gear, initiating movement of the landing gear from a extended position to a retracted position in which the landing gear is at least partially positioned in the landing gear well.
- [c2]            2.        The method of claim 1 wherein initiating movement of a landing gear door to an open position includes automatically initiating movement of a landing gear door while the aircraft is still in contact with the runway.
- [c3]            3.        The method of claim 1 wherein initiating movement of a landing gear door to an open position includes automatically initiating movement of a landing gear door in response to detecting upward rotation of the aircraft.
- [c4]            4.        The method of claim 1 wherein receiving a request to retract the landing gear includes receiving a request associated with a control input manually generated by a pilot of the aircraft.

- [c5]            5.     The method of claim 1, further comprising automatically initiating closure of the landing gear door when the landing gear is at least approximately in the retracted position.
- [c6]            6.     The method of claim 1, further comprising:  
after initiating movement of the landing gear from the extended position to the retracted position, automatically reducing the speed of the landing gear as it moves toward the retracted position; and  
while the speed of the landing gear is being reduced, automatically initiating closure of the landing gear door.
- [c7]            7.     A method for retracting a landing gear of an aircraft during takeoff, the method comprising:  
receiving a first signal during movement of the aircraft down a runway, the first signal corresponding to at least a first aspect of motion of the aircraft;  
in response to receiving the first signal, initiating movement of a landing gear door to an open position from a closed position in which the landing gear door at least partially covers a landing gear well;  
receiving a second signal after the aircraft has lifted off of the runway, the second signal corresponding to at least a second aspect of motion of the aircraft different from the first aspect of motion; and  
in response to receiving the second signal, initiating movement of the landing gear from an extended position to a retracted position in which the landing gear is at least partially positioned in the landing gear well.
- [c8]            8.     The method of claim 7 wherein receiving a first signal includes receiving a signal that is automatically generated.

- [c9]            9.     The method of claim 7 wherein receiving a first signal includes receiving a signal that is automatically generated in response to the aircraft reaching a preselected speed.
- [c10]           10.    The method of claim 7 wherein receiving a first signal includes receiving a signal that is automatically generated in response to the aircraft reaching a preselected attitude.
- [c11]           11.    The method of claim 7 wherein receiving a first signal includes receiving a signal that is automatically generated in response to the aircraft generating a preselected amount of lift.
- [c12]           12.    The method of claim 7 wherein receiving a first signal includes receiving a signal that is automatically generated in response to a change in load on the landing gear.
- [c13]           13.    The method of claim 7 wherein the aircraft further includes a fuselage and a nose gear extendable downwardly from the fuselage, and wherein receiving a first signal includes receiving a signal that is automatically generated in response to a change in load on the nose gear.
- [c14]           14.    The method of claim 7 wherein the landing gear includes a wheel truck pivotally mounted to a main strut, and wherein receiving a first signal includes receiving a signal that is automatically generated in response to movement of the wheel truck relative to the main strut.
- [c15]           15.    The method of claim 7 wherein receiving a second signal includes receiving a signal that is manually generated by a pilot of the aircraft.

[c16] 16. The method of claim 7 wherein receiving a second signal includes receiving a signal that is manually generated by a pilot of the aircraft in response to the aircraft achieving a positive rate of climb.

[c17] 17. The method of claim 7 wherein receiving a first signal includes receiving a signal that is automatically generated, and wherein receiving a second signal includes receiving a signal that is manually generated by a pilot of the aircraft.

[c18] 18. The method of claim 7 wherein receiving a first signal includes receiving a first signal that is associated with a first manual control input from a pilot of the aircraft, and wherein receiving a second signal includes receiving a second signal that is associated with a second manual control input from a pilot of the aircraft.

[c19] 19. A method for retracting a landing gear of an aircraft, the method comprising:

after the aircraft has lifted off a runway, automatically initiating movement of a landing gear door to an open position from a closed position in which the landing gear door at least partially covers a landing gear well;

after automatically initiating movement of the landing gear door, receiving a request to retract the landing gear; and

in response to receiving the request to retract the landing gear, initiating movement of the landing gear from a extended position to a retracted position in which the landing gear is at least partially positioned in the landing gear well.

[c20]           20.     The method of claim 19 wherein automatically initiating movement of a landing gear door includes automatically initiating movement of a landing gear door in response to detecting liftoff of the aircraft from the runway.

[c21]           21.     The method of claim 19 wherein receiving a request to retract the landing gear includes receiving a request associated with a control input manually generated by a pilot of the aircraft.

[c22]           22.     A method for retracting a landing gear of an aircraft during takeoff, the method comprising:

          detecting upward motion of the aircraft as it moves down a runway;  
          in response to detecting the upward motion of the aircraft, initiating movement of a landing gear door to an open position from a closed position in which the landing gear door at least partially covers a landing gear well;  
          after initiating movement of the landing gear door, receiving a request to retract the landing gear; and  
          in response to receiving the request to retract the landing gear, initiating movement of the landing gear from an extended position to a retracted position in which the landing gear is at least partially positioned in the landing gear well.

[c23]           23.     The method of claim 22 wherein detecting upward motion of the aircraft as it moves down a runway includes receiving a signal that is automatically generated when the aircraft rotates to a preselected angle relative to the runway.

[c24]           24.     The method of claim 22 wherein receiving a request to retract the landing gear includes receiving a request associated with a control input manually generated by a pilot of the aircraft.

- [c25] 25. The method of claim 22, further comprising:  
detecting the landing gear is at least approximately fully retracted; and  
in response to detecting the landing gear is at least approximately fully retracted, initiating movement of the landing gear door from the open position to the closed position.
- [c26] 26. A computer-readable medium including instructions configured to cause a controller to retract a landing gear of an aircraft during takeoff, the controller retracting the landing gear by a method comprising:  
while the aircraft is moving down a runway, initiating movement of a landing gear door to an open position from a closed position in which the landing gear door at least partially covers a landing gear well;  
after initiating movement of the landing gear door, receiving a request to retract the landing gear; and  
in response to receiving the request to retract the landing gear, initiating movement of the landing gear from a extended position to a retracted position in which the landing gear is at least partially positioned in the landing gear well.
- [c27] 27. The computer-readable medium of claim 26 wherein initiating movement of a landing gear door to an open position includes automatically initiating movement of a landing gear door while the aircraft is still in contact with the runway.
- [c28] 28. The computer-readable medium of claim 26 wherein initiating movement of a landing gear door to an open position includes automatically initiating movement of a landing gear door in response to detecting upward rotation of the aircraft.

[c29] 29. The computer-readable medium of claim 26 wherein initiating movement of a landing gear door to an open position includes automatically initiating movement of a landing gear door in response to detecting a preselected air speed.

[c30] 30. The computer-readable medium of claim 26 wherein the aircraft further includes a fuselage and a nose gear extendable downwardly from the fuselage, and wherein initiating movement of a landing gear door to an open position includes automatically initiating movement of a landing gear door in response to detecting a change in load on the nose gear.

[c31] 31. The computer-readable medium of claim 26 wherein receiving a request to retract the landing gear includes receiving a signal that is manually generated by a pilot of the aircraft.

[c32] 32. A system for retracting a landing gear of an aircraft, the system comprising:

means for initiating movement of a landing gear door from a closed position to an open position while the aircraft is moving down a runway, wherein the landing gear door at least partially covers a landing gear well when the landing gear door is in the closed position;

means for receiving a request to retract the landing gear after initiating movement of the landing gear door; and

means for initiating movement of the landing gear from a extended position to a retracted position in response to receiving the request to retract the landing gear, wherein the landing gear is at least partially positioned in the landing gear well when the landing gear is in the retracted position.

[c33]            33.    The system of claim 32 wherein the means for receiving a request to retract the landing gear includes means for receiving a signal that is automatically generated.

[c34]            34.    The system of claim 32 wherein the means for initiating movement of a landing gear door includes means for receiving a signal that is automatically generated in response to the aircraft generating a preselected amount of lift.

[c35]            35.    The system of claim 32 wherein the aircraft further includes a fuselage and a nose gear extendable downwardly from the fuselage, and wherein the means for initiating movement of a landing gear door includes means for receiving a signal that is automatically generated in response to a change in load on the nose gear.

[c36]            36.    The system of claim 32 wherein the means for receiving a request to retract the landing gear includes means for receiving a signal that is manually generated by a pilot of the aircraft.

[c37]            35.    An aircraft system comprising a controller configured to be operably coupled to a landing gear door and a landing gear of an aircraft, the landing gear being movable between an extended position and a retracted position, the landing gear door being movable between a closed position and an open position, wherein the controller is configured to retract the landing gear by a method comprising:

                 receiving a first signal during movement of the aircraft down a runway, the first signal corresponding to at least a first aspect of motion of the aircraft;

                 in response to receiving the first signal, initiating movement of the landing gear door from the closed position to the open position;



receiving a second signal separate from the first signal after the aircraft has lifted off of the runway, the second signal corresponding to at least a second aspect of motion of the aircraft; and  
in response to receiving the second signal, initiating movement of the landing gear from the extended position to the retracted position.

[c38] 38. The aircraft system of claim 37, further comprising the landing gear.

[c39] 39. The aircraft system of claim 37, further comprising a hydraulic system configured to be operably coupled to the landing gear and the landing gear door, wherein the controller is operably connectable to the hydraulic system and configured to at least approximately level-load the hydraulic system during retraction of the landing gear.

[c40] 40. The aircraft system further comprising:  
a fuselage;  
a wing extending outwardly from the fuselage; and  
the landing gear, wherein the landing gear is pivotally mounted to at least one of the wing and the fuselage.

[c41] 41. An aircraft system comprising:  
landing gear movable between an extended position and a retracted position, wherein the landing gear is at least partially stowed in a gear well when the landing gear is in the retracted position;  
a landing gear door movable between an open position and a closed position, wherein the landing gear door at least partially covers the gear well when the landing gear door is in the closed position;  
at least a first actuator operably coupled to the landing gear and configured to move the landing gear between the extended position and the retracted position;

at least a second actuator operably coupled to the landing gear door and configured to move the landing gear door between the open position and the closed position; and

a controller operably coupled to the first and second actuators, wherein the controller is configured to cause the second actuator to open the gear door in response to a first signal, and wherein the controller is further configured to cause the first actuator to retract the landing gear in response to a second signal different from the first signal.

[c42]           42.     The aircraft system of claim 41 wherein the controller is configured to cause the second actuator to open the gear door in response to an automatically generated signal, and wherein the controller is further configured to cause the first actuator to retract the landing gear in response to a manually generated signal.

[c43]           43.     The aircraft system of claim 41 wherein the controller is configured to cause the second actuator to open the gear door in response to a signal that is automatically generated by an aspect of aircraft motion, and wherein the controller is further configured to cause the first actuator to retract the landing gear in response to a signal that is manually generated.

[c44]           44.     The aircraft system of claim 41 wherein the controller is configured to cause the second actuator to open the gear door in response to a signal that is automatically generated by aircraft rotation, and wherein the controller is further configured to cause the first actuator to retract the landing gear in response to a signal that is manually generated when the aircraft achieves a positive rate of climb.

[c45]           45.     The aircraft system of claim 41 wherein the first and second actuators are hydraulic actuators, wherein the aircraft system further comprises a

hydraulic system operably coupled to the first and second actuators, and wherein the controller is operably coupled to the hydraulic system, the controller being configured to cause the hydraulic system to move the second actuator and open the gear door in response to a first signal, the controller being further configured to cause the hydraulic system to move the first actuator and retract the landing gear in response to a second signal different from the first signal.

[c46]            46.     The aircraft system of claim 45 wherein the controller is configured to level-load the hydraulic system during retraction of the landing gear and closure of the gear door such that the flow of hydraulic fluid is maintained at or below an at least approximately constant level.